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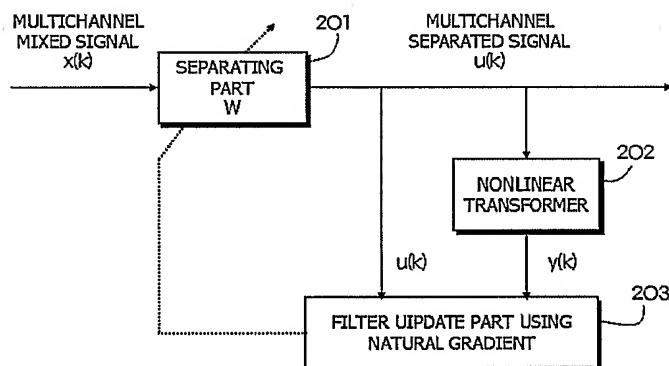
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(54) Title: THE METHODS AND APPARATUS FOR BLIND SEPARATION OF MULTICHANNEL CONVOLUTIVE MIXTURES IN THE FREQUENCY DOMAIN



(57) **Abstract:** A method and apparatus is disclosed for performing blind source separation using frequency-domain normalized multichannel blind deconvolution. In an embodiment of this invention, the multichannel mixed signals are formed as frames of  $N$  samples, which consist of  $r$  consecutive blocks of  $M$  samples. The frames of mixed signals are separated using separating filters in the frequency domain in an overlap-save manner using a discrete Fourier transform (DFT). The separated signals are then converted back into the time domain using the inverse DFT to be applied to a nonlinear function. The cross-power spectra between separated signals and nonlinear-transformed signals are computed and are normalized by the power spectra of separated signals and the power spectra of nonlinear-transformed signals to have flat spectra. The invention then applies the time domain constraint to preserve the first  $L$  cross-correlations. These alias-free normalized cross-power spectra are further constrained by nonholonomic constraints. The invention then computes natural gradient by convolving alias-free normalized cross-power spectra with separating filters. After the length of separating filters is constrained to  $L$ , separating filters are updated using the natural gradient and normalized to have unit norm. The terminating conditions are checked to see if separating filters converged.

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